A lower market value per MHz for television broadcast licenses than for cellular licenses does not imply that television broadcasting is more competitive than the provision of cellular service, or that cellular carriers have more market power than television broadcasters. Rather, it means that there is greater demand for cellular licenses (and the service they can be used to provide) than for broadcast licenses, relative to the amount of spectrum provided for each. In fact, Kwerel and Williams cite evidence of cellular franchises trading at about thirty times as much as UHF television stations per megahertz of spectrum as an indication of possible misallocation of spectrum between the two applications.[68] They find that there would be net social benefits if 18 MHz of spectrum used to provide UHF broadcasting in Los Angeles were reallocated to provide cellular service.[69]

Similarly, differences in the intensity of demand for cellular services across service areas mean that the scarcity value of the spectrum will vary across service areas. The low earnings of cellular carriers in rural areas, an outcome the CPUC attributes only to small customer bases and slow growth relative to large fixed costs,[70] are reflected in the lower value of spectrum in these areas.

Other Elements of Investment Base

The CPUC has also ignored other important elements that appropriately enter the investment base upon which a rate of return is calculated. Outlays such as expenditures on research and development and on certain types of marketing activity can be expected to yield most or all of their benefits in future years rather than in the year in which they are made, and

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[68]Kwerel and Williams, p. 1.
[69]Op. cit., p. vii.
[70]Petition, p. 47.

are appropriately capitalized rather than expensed. With the carriers' investment in cellular service substantially understated, it is not surprising that their rates of return are overstated. The estimated rates of return reveal more about the assumptions and procedures used to calculate them than about whether or not the carriers are earning monopoly profits.[71]

Q Ratios

The CPUC's reliance on Q ratios as an indicator of market power is also misplaced. First, the Commission apparently believes that high Q ratios permit it to distinguish monopoly profits from scarcity rents. High Q ratios, however, are as consistent with scarcity rents as they are with monopoly profits.

The Commission appears to confuse outcomes that occur because of restrictions on entry with outcomes caused by noncompetitive behavior on the part of the cellular carriers. However, there is no inconsistency in there being regulatory-imposed barriers to entry while the firms in the market are competing vigorously. In these circumstances, the Q ratio will remain high if no one can acquire additional spectrum to reduce the gap between market value and replacement cost. The market value of a company depends on investor expectations about its future earnings, while replacement value reflects the firm's past investments. Thus, high Q ratios are perfectly consistent with prices being at the competitive level, that is, the level that would prevail if the same amount of spectrum were divided among a much larger number of firms. Simply put, the values of Q ratios for cellular carriers do not indicate whether or not the carriers are behaving competitively.

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[71] Clarkson and Miller, op. cit., pp. 100-103.

Second, even if the scarcity value of the electromagnetic spectrum were properly accounted for, the Commission misinterprets the significance of a Q ratio equal to one. Following Professor Hazlett, the Commission states that "[f]or a competitive market the ratio is one or near one."[72] This statement is true, however, only if the industry is in long-run equilibrium. A firm or industry with a small customer base but with expectations of high rates of growth can have a Q ratio well in excess of one. Furthermore, the value of its Q ratio will remain high as long as scarcity of an input (in this case, spectrum) prevents the flow of additional resources into the market and further expansion of market output.

IV. CAPACITY UTILIZATION AND EXPANSION

Excess Capacity

The CPUC makes a number of assertions about the rate of capacity utilization of California cellular carriers, and then uses these assertions to draw inferences about the competitiveness of cellular markets in the state. In particular, the Commission asserts that: (1) cellular carriers are not operating at maximum capacity;[73] (2) capacity is underutilized even in the Los Angeles MSA, the state's most populous region;[74] (3) the rate of capacity utilization in the San Francisco Bay Area MSA has remained approximately constant during a four-year period in which demand and capacity have increased;[75] and (4) the number of pricing plans that provide for volume and other discounts has proliferated, evidence that the carriers are not using their allocated spectrum to maximum capacity.[76]

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[72]Petition, p. 62.
[73]Petition, p. 51.
[74]Id.
[75]Petition, p. 52.
[76]Petition, p. 54.

The CPUC offers each of these assertions as evidence in support of its claim that cellular carriers in California are charging prices above the competitive level and achieving excessive earnings. However, each of these claims is equally consistent with competitive behavior on the part of these carriers.[77]

Determinants of Capacity Utilization

The capacity of a cellular system is provided by the carrier's physical infrastructure -- the number of simultaneously usable channels in each cell site.[78] Capacity is a primary and essential input to the production of cellular service. When capacity is less than the maximum calling demand, some customers cannot be served, and the quality of service to customers who are able to complete calls is degraded since the probability that their call will be blocked is increased.

Capacity utilization is determined by: (a) cell-site channel capacity; (b) the carrier's peak demand for calls in the market; and (c) the distribution of peak demand over each cell. Capacity is a "lumpy" economic good -- one that is not finely divisible. Consequently, to supply growing demand, carriers must expand capacity in large, discrete amounts. Expansion of cellular capacity is accomplished by subdividing existing cells, modifying antenna coverage, and using more spectrum-efficient technology. This investment is subject to increasing costs, especially if the service area is repeatedly subdivided.

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[77]Because all of the data on capacity utilization cited by the CPUC are redacted, it is not possible to evaluate the Commission's factual claims for accuracy or relevance.

[78]It should be clear that the term "capacity" is being used here to describe the level of output that a carrier can provide at a point in time, which depends on the amount of spectrum for which it has a license, the physical capital the carrier has in place, and the technology it employs. This is different from the definition of capacity used above in measuring market concentration, which is based on the maximum output a carrier could produce with the spectrum assigned to it if it made the appropriate complementary investments.

A carrier seeking to minimize overall costs and facing growing demand faces a choice between two investment strategies: (1) initially building a large number of small and micro-cells, with large aggregate capacity, or (2) building a small number of wider-area cells, and then subdividing and retrofitting. In either case, because additions to capacity are most efficiently made in discrete amounts, cellular carriers will often be observed with what appears to be excess capacity. It is simply uneconomic, in a market with rapidly growing demand and lumpy investments, for carriers to have precisely the capacity that is needed to serve demand at any given time. Thus, the Commission's observation of excess capacity in Los Angeles, and in California as a whole, implies nothing about the competitiveness of the cellular market.

Moreover, expansion of capacity at about the rate at which demand is expanding, and hence an approximately unchanged rate of capacity utilization over time, is consistent with optimal investment planning by competitive firms. Thus, the observation of a roughly unchanged rate of utilization reveals nothing about the extent to which the market is competitive.

Pricing and Capacity Utilization

Under certain conditions, when increases in capacity are lumpy, it is efficient for the price of service to vary inversely with the rate of capacity utilization. Here, prices would be lowest for service in a segment of the market in which new capacity has just been added and demand can be stimulated without exceeding the available capacity. As demand grows over time and capacity utilization rises, prices would be increased to ensure an adequate margin of capacity for peak calls. With still more growth in demand, the carrier would install an additional lump of capacity and again reduce the service price.

In practice, companies in most capital-intensive industries do not vary prices of their basic products over time, responding to the preferences of many consumers for known, stable prices. Instead, firms use a wide variety of promotional and volume-related pricing schedules to encourage additional purchases in segments of the market in which they currently have spare capacity. Two-part tariffs, volume discounts, and limited-term promotions are widely used in energy, transportation, and communications industries.

This analysis has two implications. First, prices are unlikely to be, and should not be, adjusted to eliminate excess capacity at every point in time. Second, the use of alternatives to the basic pricing plan, rather than being evidence of anticompetitive behavior on the part of cellular carriers, instead indicates that the carriers are attempting to raise their utilization rates.[79]

"Excess" Capacity as Competition in Quality of Service

In cellular telephony, capacity can provide a second essential function -- the ability to supply high-quality service. Capacity in excess of the maximum calling demand enables a carrier to supply dial tone and to complete incoming calls during the busiest hours of the week. Greater capacity in the form of a large number of cells reduces the likelihood of geographic gaps in signal coverage and minimizes call drop-outs when subscribers are traveling between cells. Additional capacity can provide unoccupied channels to which calls can be shifted if interference is encountered, thus improving the voice quality of service.

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[79]This is another instance in which the carriers face a "Catch 22" in their dealings with the Commission. If they do not offer alternative plans, they are accused of having excess capacity. If they offer such plans, this is treated as evidence that they are trying to eliminate excess capacity.

The CPUC claims "that basic economic principles dictate that when excess capacity exists, prices in a competitive market should drop."[80] This single-minded view entirely neglects the role of capacity in producing service quality and enabling carriers to differentiate their products with respect to service quality -- areas of coverage, voice quality, percentage of calls dropped. The observation of "excess" capacity in the cellular industry is, in fact, evidence of such competition in service quality.

V. CONCLUSION

The California Public Utilities Commission is requesting authority to continue to regulate the rates of cellular carriers. This request should be rejected for two reasons. First, as we have demonstrated in this paper, the evidence on which the Commission has based its request is flawed. Much of this evidence has either been interpreted incorrectly by the Commission, or can be interpreted just as easily as evidence of competition rather than its opposite. The Commission began with the premise that the cellular market is uncompetitive and concluded that this was the case. The "evidence" cited by the Commission appears to have played an insignificant role in the conclusion it has reached.

Second, and perhaps more important, the nation is about to enter a new era in which the number of firms supplying mobile telecommunications services will more than double, effective industry capacity will increase more than fourfold, measured industry concentration will decline by more than half, and the share of the industry's effective capacity licensed to each of the two current cellular providers will decline by more than two-thirds. As the number of carriers increases, and market concentration as measured by the HHI decreases, the industry is

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[80]Petition, p. 53.

likely to become more competitive. Thus, the CPUC has chosen to attempt to extend its regulation of cellular carriers at precisely the moment at which the structure of the mobile telecommunications market is being radically changed by increases both in the number of competitors and in the amount of spectrum that is available to provide mobile telecommunications services. It is difficult to think of a request that has been more poorly timed.

Table 1

HHI Calculations for a Wireless Telecommunications Market with Two Cellular Carriers and Six PCS Providers

Ratio of Digital to Analog Effective Capacity / 6:1
Cellular Operators' Bandwidth Devoted to Analog:10 MHz

Firms	Bandwidth	Effective Capacity	Market Share	HHI Contribution
Cellular 1	25	100	10.9%	118
Cellular 2	25	100	10.9%	118
PCS 3	30	180	19.6%	383
PCS 4	30	180	19.6%	383
PCS 5	30	180	19.6%	383
PCS 6	10	60	6.5%	43
PCS 7	10	60	6.5%	43
PCS 8	10	60	6.5%	43
Totals	170	920	100.0%	1,512

Source: Second Report and Order in FCC GEN Docket No. 90-314, Issued October 22, 1993; and Charles River Associates.

Table 2

HHI Calculations for a Wireless Telecommunications Market with Two Celluar Carriers, Six PCS Providers and One SMR Provider

Ratio of Digital to Analog Effective Capacity / 6:1
Cellular Operators' Bandwidth Devoted to Analog:10 MHz

Firms	Bandwidth	Effective Capacity	Market Share	HHI Contribution
Cellular 1	25	100	10.2%	104
Cellular 2	25	100	10.2%	104
PCS 3	30	180	18.4%	337
PCS 4	30	180	18.4%	337
PCS 5	30	180	18.4%	337
PCS 6	10	60	6.1%	37
PCS 7	10	60	6.1%	37
PCS 8	10	60	6.1%	37
SMR 9	10	60	6.1%	37
Totals	180	980	100.0%	1,370

Source: Second Report and Order in FCC GEN Docket No. 90-314, Issued October 22, 1993; and Charles River Associates.

Table 3

HHI Calculations for a Wireless Telecommunications Market with *Two Celluar Carriers with PCS Licenses and Four PCS Providers*
Ratio of Digital to Analog Effective Capacity / 6:1

Cellular Operators' Bandwidth Devoted to Analog:10 MHz

Firms	Bandwidth	Effective Capacity	Market Share	HHI Contribution
Cellular 1	35	160	17.4%	302
Cellular 2	35	160	17.4%	302
PCS 3	40	240	26.1%	681
PCS 4	30	180	19.6%	383
PCS 5	30	180	19.6%	383
Totals	170	920	100.0%	2,051

Source: Second Report and Order in FCC GEN Docket No. 90-314, Issued October 22, 1993; and Charles River Associates.

Table 4

HHI Calculations for a Wireless Telecommunications Market withTwo Cellular Carriers with PCS Licenses, Four PCS Providers and One SMR Provider

Ratio of Digital to Analog Effective Capacity / 6:1
Cellular Operators' Bandwidth Devoted to Analog:10 MHz

Firms	Bandwidth	Effective Capacity	Market Share	HHI Contribution
Cellular 1	35	160	16.3%	267
Cellular 2	35	160	16.3%	267
PCS 3	40	240	24.5%	600
PCS 4	30	180	18.4%	337
PCS 5	30	180	18.4%	337
SMR 6	10	60	6.1%	37
Totals	180	980	100.0%	1,845

Source: Second Report and Order in FCC GEN Docket No. 90-314, Issued October 22, 1993; and Charles River Associates.

Table 5

Comparison of Rate Plans

City	Percent Difference[1]: Basic Plans			Percent Difference[1]: Optimal Plans[2]		
	Low	Medium	High	Low	Medium	High
Bakersfield	9.09%	5.45%	0.00%	6.49%	3.64%	0.00%
Fresno/Visalia	9.09%	5.45%	0.00%	7.79%	3.64%	3.13%
Los Angeles[3]	0.00%	0.00%	0.00%	46.84%	11.48%	7.69%
Sacramento	17.86%	18.00%	14.81%	17.86%	15.00%	11.11%
San Francisco/San Jose	7.48%	6.85%	2.08%	0.00%	0.00%	9.52%

[1]Percent difference is calculated for rates in effect on December 31, 1993 for the various usage volumes.

[2]Optimal plans are the best price plans at the various usage volumes (60 minutes [low], 120 minutes [medium], and 480 minutes [high]) using monthly access rates, minutes included in access, peak and off-peak rates and an 80/20 peak and off-peak split.

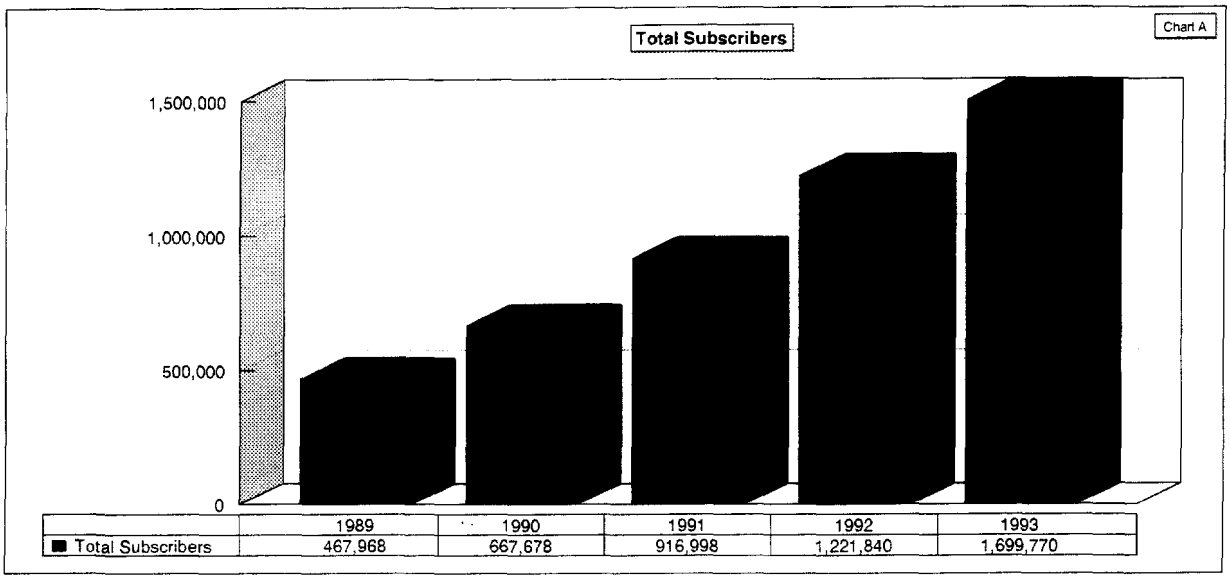
[3]One carrier offers two basic rate plans, with the second rate plan targeted towards offpeak usage. This second rate plan yields a difference of 1.72%, 22.78%, and 58.82% for low, medium, and high volumes, respectively.

SOURCE: Ernst and Young, Table A in "Reply Comments of the Cellular Carriers Association of California" in I.93-12-007, The Public Utilities Commission of the State of California, Investigation on the Commission's Own Motion into Mobile Telephone Service and Wireless Communications, March 18, 1994, p. 8.

B

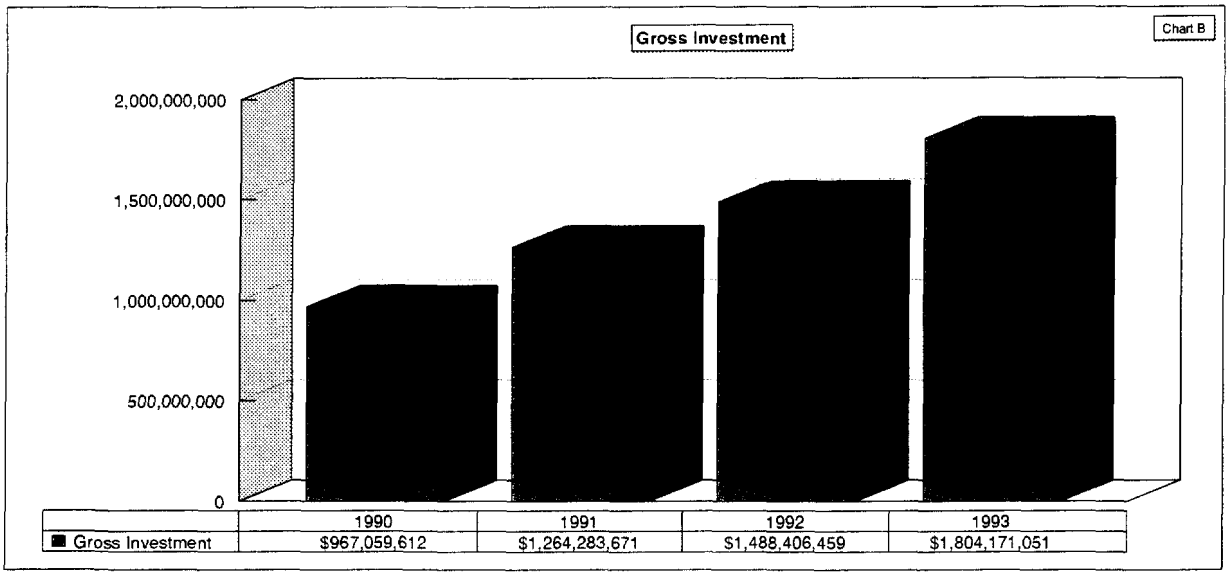
Appendix B - Cellular Carriers Association of California Response - PR File No. 94-SP3

Chart A



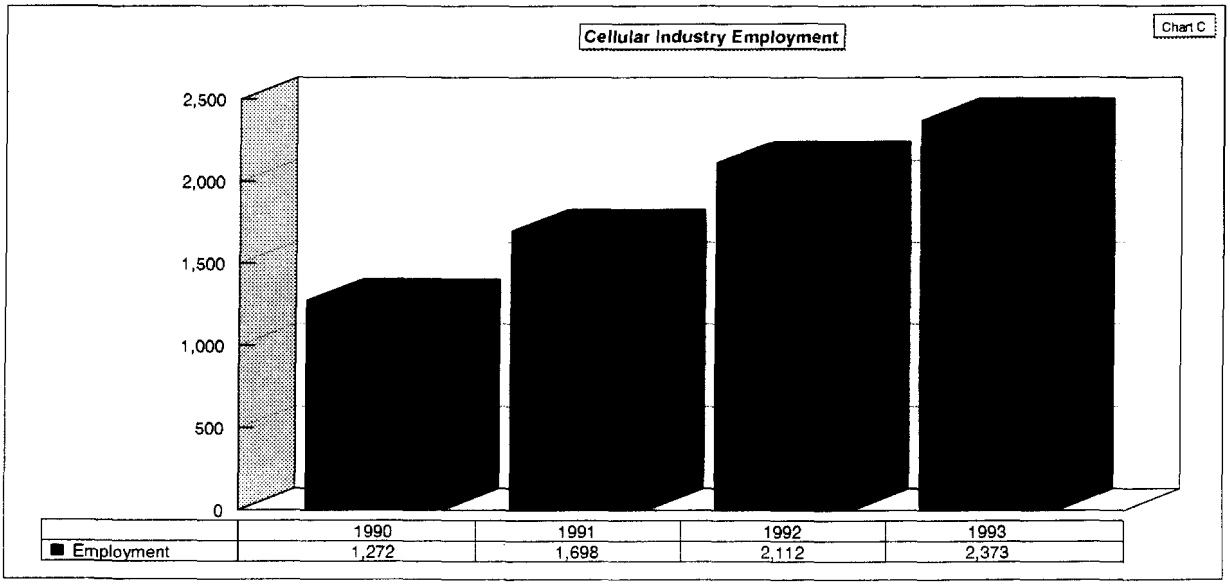
	1989	1990	1991	1992	1993
Total Subscribers	467,968	667,678	916,998	1,221,840	1,699,770

Chart B



	1990	1991	1992	1993
Gross Investment	$967,059,612	$1,264,283,671	$1,488,406,459	$1,804,171,051

Chart C



	1990	1991	1992	1993
Employment	1,272	1,698	2,112	2,373

California Only

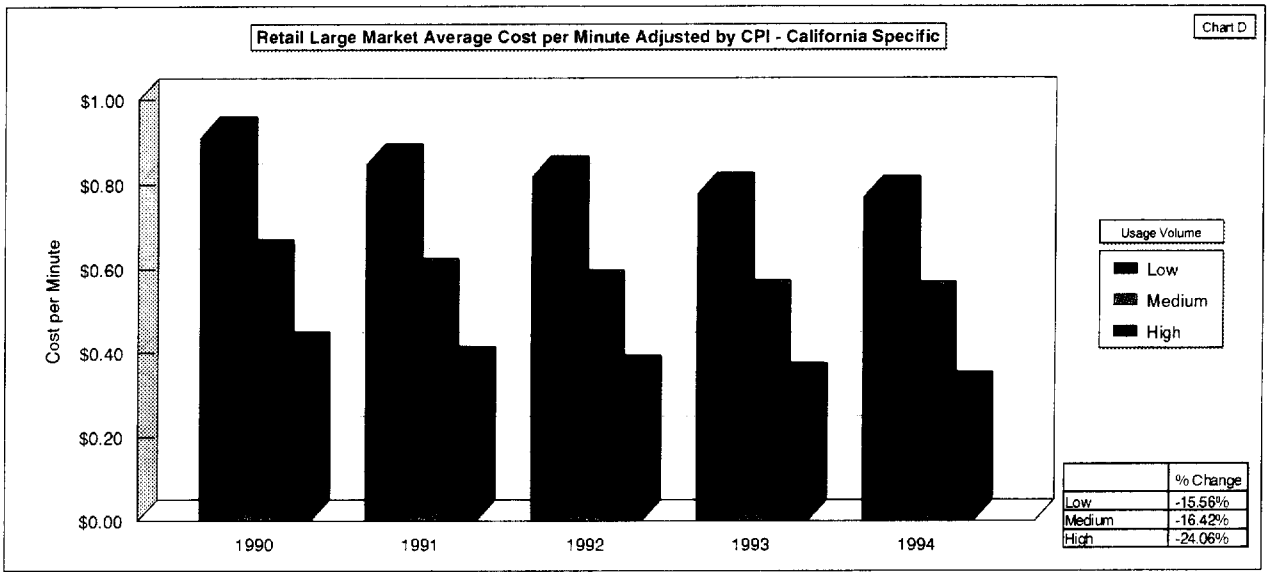


Chart D
Retail Large Market Average Cost per Minute Adjusted by CPI - California Specific
Cost per Minute
$1.00
$0.80
$0.60
$0.40
$0.20
$0.00
1990
1991
1992
1993
1994
Usage Volume
Low
Medium
High
% Change
Low -15.56%
Medium -16.42%
High -24.06%

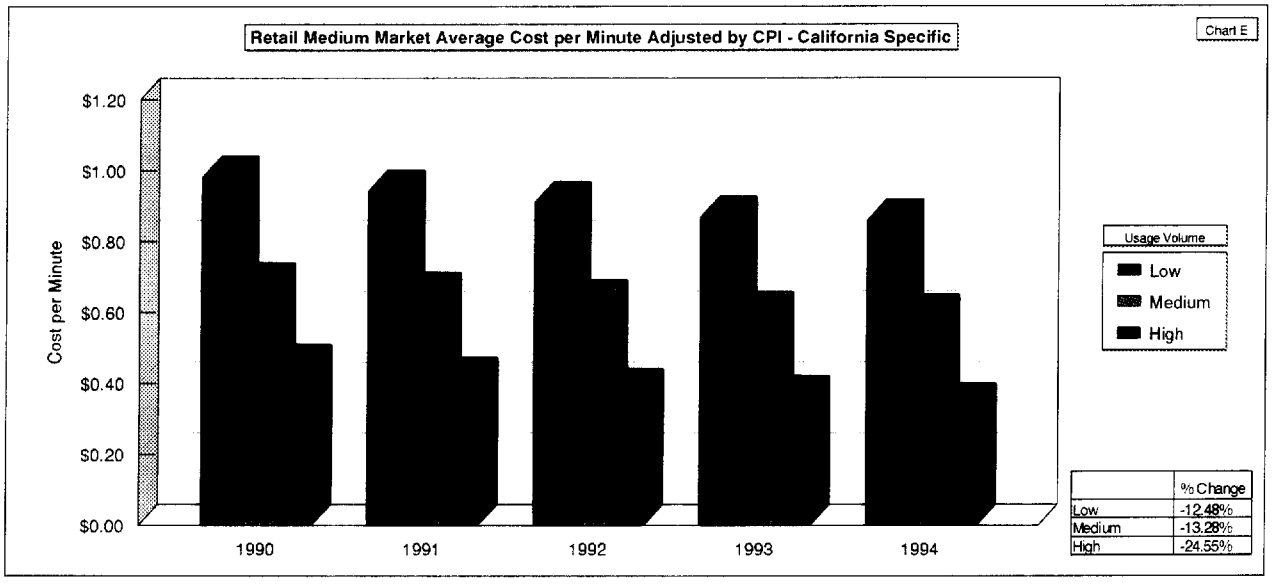


Chart E
Retail Medium Market Average Cost per Minute Adjusted by CPI - California Specific
Cost per Minute
$1.20
$1.00
$0.80
$0.60
$0.40
$0.20
$0.00
1990
1991
1992
1993
1994
Usage Volume
Low
Medium
High
% Change
Low -12.48%
Medium -13.28%
High -24.55%

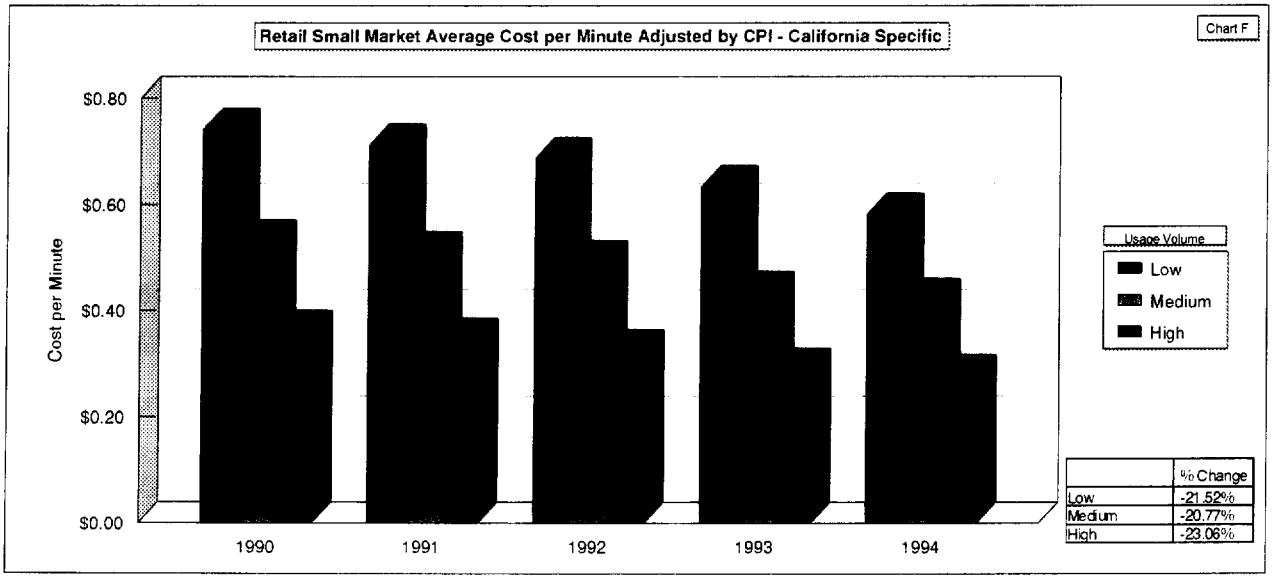
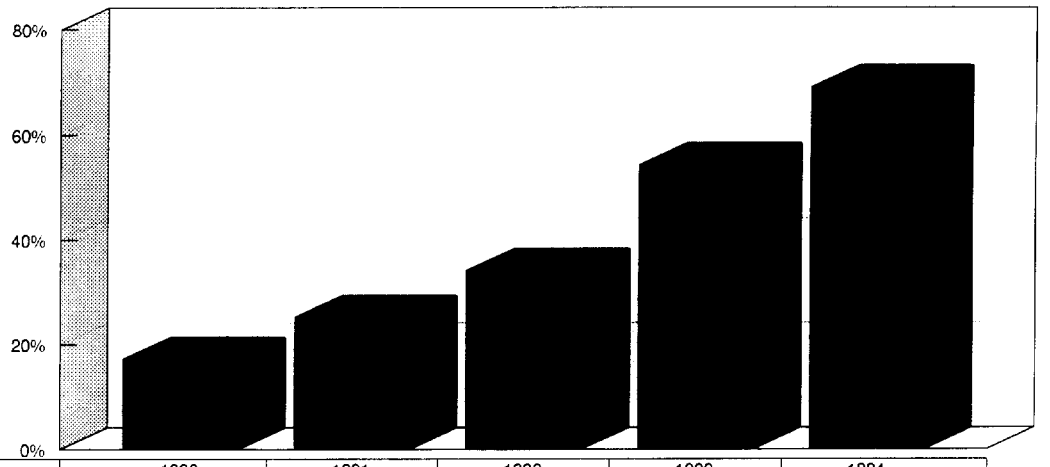


Chart F
Retail Small Market Average Cost per Minute Adjusted by CPI - California Specific
Cost per Minute
$0.80
$0.60
$0.40
$0.20
$0.00
1990
1991
1992
1993
1994
Usage Volume
Low
Medium
High
% Change
Low -21.52%
Medium -20.77%
High -23.06%

Chart G

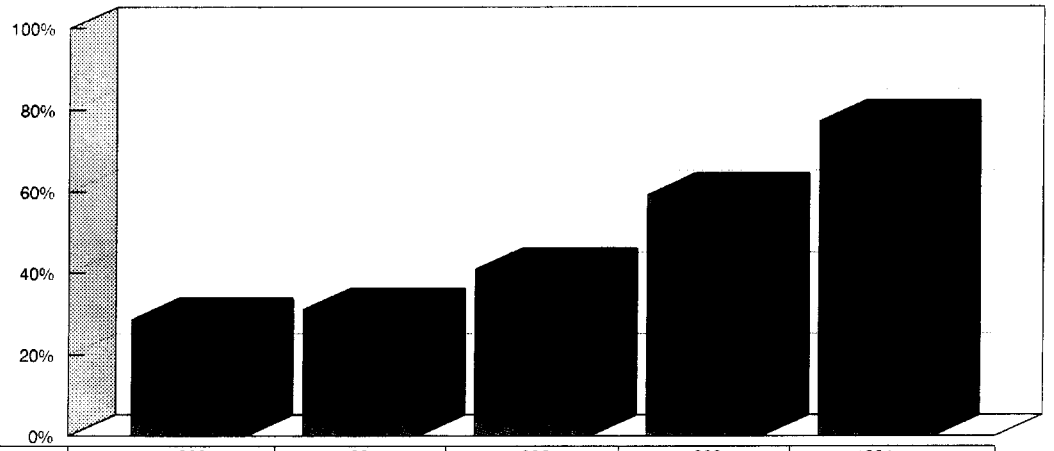
Retail Large Market Average Percent of Subscribers Receiving Discounts



	1990	1991	1992	1993	1994
Average Percent	17.27%	25.13%	34.13%	54.23%	68.95%

Chart H

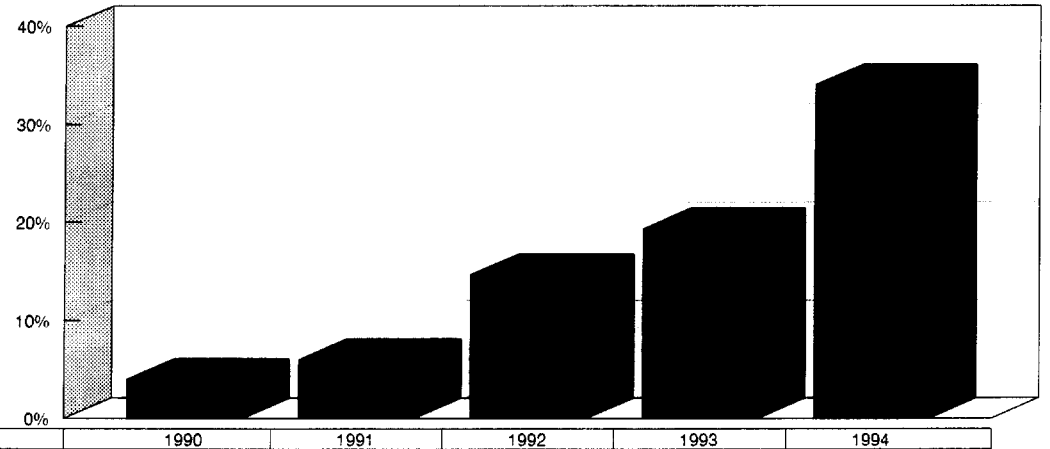
Retail Medium Market Average Percent of Subscribers Receiving Discounts



	1990	1991	1992	1993	1994
Average Percent	28.60%	31.08%	40.92%	59.18%	77.17%

Chart I

Retail Small Market Average Percent of Subscribers Receiving Discounts



	1990	1991	1992	1993	1994
Average Percent	4.00%	6.00%	14.67%	19.33%	34.00%

Chart J

Comparison of the Annual Amount Paid Utilizing a Promotion

Plan	Promotion Type	Type of User	Annual Amount Paid Without Promotion	Annual Amount Paid With Promotion	Percent Difference
Plan A	One Month of Access Reduction	Low	$743.88	$718.88	3.36%
Plan B	Two Months of Access Reduction	Medium	$1,006.92	$926.92	7.95%
Plan C	Two Months of Access Reduction	High	$2,122.44	$1,972.44	7.07%

The three plans are from a cellular carrier in one of the large markets. The annual cost comparison is between a plan utilizing a promotion and the annual cost without the promotion. The comparison is for low, medium, and high users.

Assumptions Underlying Retail CCAC Results

Approach

- Effective cost per minute rates for each rate plan were calculated at various usage volumes for each market using monthly access rates, minutes included in access, peak and off-peak rates, and an 80/20 peak and off-peak split and discounts for certain levels of usage. From the calculations a single optimal rate plan per market was determined. These optimal plans were segregated by market size and averaged on a straight line basis. The calculated rates were adjusted for inflation using a California specific Consumer Price Index for all urban consumers.

- The following items were excluded from our analysis:
  - Activation charges
  - Multi-line rate plans
  - Seasonal, weekend, promotional or limited area plans

Market Size

Large Markets - Population Over 500,000

- Bakersfield
- Fresno/Visalia
- Los Angeles
- Napa/Santa Rosa
- Sacramento
- San Diego
- San Francisco/San Jose
- Stockton/Modesto
- Ventura

Medium Markets - Population 200,000 to 500,000

- Redding/Tehama
- RSA #4 - Madera
- Salinas/Monterey
- Santa Barbara

Small Markets - Population Under 200,000

- RSA #1 - Del Norte
- RSA #2 - Modoc
- RSA #6 - Mono
- RSA #9 - Mendocino
- RSA #11 - El Dorado

Usage Volumes

- Large Volume - 480 minutes
- Medium Volume - 120 minutes
- Small Volume - 60 minutes

California Specific CPI

- 1990 CPI 135.0
- 1991 CPI 140.6
- 1992 CPI 145.6
- 1993 CPI 149.4
- 1994 CPI 151.1

Inflation from 1990 to 1994 equates to 11.93%

Categorization of Users

- High - Uses 121 or greater minutes per month
- Medium - Uses 61-120 minutes per month
- Low - Uses 0-60 minutes per month

C

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Investigation on the Commission's Own Motion into Mobile Telephone Service and Wireless Communications.	)	I.93-12-007

APPLICATION OF
CELLULAR CARRIERS ASSOCIATION OF CALIFORNIA
FOR REHEARING OF DECISION 94-08-022 AND REQUEST FOR STAY

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September 6, 1994

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